

# ENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>DM/HSo/P1074PC</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 00/ 02350</b>	International filing date (day/month/year) <b>16/06/2000</b>	(Earliest) Priority Date (day/month/year) <b>18/06/1999</b>
Applicant  <b>ROTECH HOLDINGS LIMITED</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

### 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☒ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

**Downhole roller vane pump**

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1

☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/02350

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 F04C11/00 F04C2/344 F04C15/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	W0 99 20904 A (GRUPPING ARNOLD W) 29 April 1999 (1999-04-29)	1-21, 26-36, 43,44, 59,60, 74-77 37-41
Y	claim 1; figures 1-3 ---	
Y	GB 2 310 254 A (LEDINGHAM CHALMERS TRUSTEE COM) 20 August 1997 (1997-08-20) claims 1-4 ---	37-41
X	PATENT ABSTRACTS OF JAPAN vol. 008, no. 124 (M-301), 9 June 1984 (1984-06-09) & JP 59 029788 A (HITACHI SEISAKUSHO KK), 17 February 1984 (1984-02-17) abstract --- -/-	1,3-21, 26-35

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

5 September 2000

Date of mailing of the international search report

23. 01. 2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

DIMITROULAS, P

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/02350

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9920904	A	29-04-1999	NL 1007327 C	23-04-1999
			NL 1007405 C	23-04-1999
			NL 1007613 C	23-04-1999
			AU 9765798 A	10-05-1999
			BR 9813117 A	22-08-2000
			CN 1276853 T	13-12-2000
			EP 1025362 A	09-08-2000
			NO 20001918 A	21-06-2000
-----				
GB 2310254	A	20-08-1997	NONE	
-----				
JP 59029788	A	17-02-1984	NONE	
-----				
US 1403699	A	17-01-1922	NONE	
-----				
US 2462732	A	22-02-1949	NONE	
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PC 00/02350

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9920904 A	29-04-1999	NL 1007327 C	23-04-1999
		NL 1007405 C	23-04-1999
		NL 1007613 C	23-04-1999
		AU 9765798 A	10-05-1999
		BR 9813117 A	22-08-2000
		CN 1276853 T	13-12-2000
		EP 1025362 A	09-08-2000
		NO 20001918 A	21-06-2000
GB 2310254 A	20-08-1997	NONE	
JP 59029788 A	17-02-1984	NONE	
US 1403699 A	17-01-1922	NONE	
US 2462732 A	22-02-1949	NONE	

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB 00/02350

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-21, 26-44, 59, 60, 74-77

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-21,26-44,59,60,74-77

A downhole pump with a seal made of plastic material.

2. Claims: 22-25,48

A pump where the inlet includes a one-way valve

3. Claims: 45-47

A pump which includes a plurality of pistons and biasing means

4. Claims: 49-53

A plurality of pumps arranged to be operatively connected.

5. Claims: 54-58

A pump with at least one vent hole

6. Claims: 61-73

A pump with a filter

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
28 December 2000 (28.12.2000)

PCT

(10) International Publication Number  
**WO 00/79132 A3**

(51) International Patent Classification<sup>7</sup>: **F04C 11/00**,  
2/344, 15/04

(21) International Application Number: PCT/GB00/02350

(22) International Filing Date: 16 June 2000 (16.06.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
9914150.9 18 June 1999 (18.06.1999) GB

(71) Applicant (for all designated States except US): **ROTECH HOLDINGS LIMITED** [GB/GB]; Whitemyres Avenue, Mastrick Industrial Estate, Aberdeen AB2 6HQ (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **VAN DRENTHAM SUSMAN, Hector, Filippus, Alexander** [GB/GB]; Rotech Holdings Limited, Whitemyres Avenue, Mastrick Industrial Estate, Aberdeen AB2 6HQ (GB).

(74) Agents: **McCALLUM, William, Potter et al.**; Cruikshank & Fairweather, 19 Royal Exchange Square, Glasgow G1 3AE (GB).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

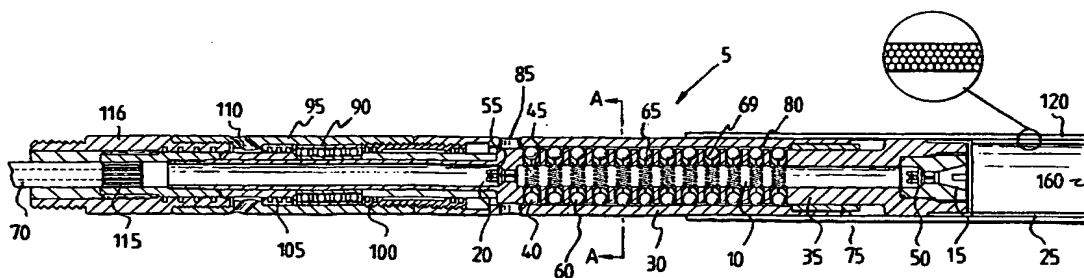
Published:

— With international search report.

(88) Date of publication of the international search report:  
3 May 2001

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DOWNHOLE ROLLER VANE PUMP



(57) Abstract: There is disclosed an improved pump (5, 5') particularly suitable for use in a method of "artificial lift" in an oil/gas well. Known pumps used in artificial lift methods suffer from a number of problems/disadvantages - e.g. low efficiency (hydraulic efficiency). The disclosed embodiments of the invention provide a pump (5, 5') which provides a positive displacement of a predetermined volume of well production fluid for each operative cycle of the pump - in contra-distinction known to pumps which provide axial flow of well production fluid. The inventive pump (5, 5') provides a chamber (10, 10') having a volume (V, V'), an inlet (15) to the chamber (10, 10'), an outlet (20) from the chamber (10, 10'), and means for varying the volume (V, V') of the chamber (10, 10'). The means for varying the volume (V, V') of the chamber (10, 10') is controlled by relative rotation of first and second bodies (30, 35; 30', 35').

WO 00/79132 A3

# INTERNATIONAL SEARCH REPORT

Inte. application No.  
PCT/GB 00/02350

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1-21, 26-44, 59, 60, 74-77

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.



REC'D 02 OCT 2001

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference DM/HSo/P10742PC		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB00/02350	International filing date (day/month/year) 16/06/2000	Priority date (day/month/year) 18/06/1999
International Patent Classification (IPC) or national classification and IPC F04C11/00		
Applicant ROTECH HOLDINGS LIMITED et al.		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 7 sheets, including this cover sheet.
  - ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

- This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 17/01/2001	Date of completion of this report 28.09.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Savela, R Telephone No. +49 89 2399 2685 

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02350

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, pages:**

1-20 as originally filed

**Claims, No.:**

1-77 as originally filed

**Drawings, sheets:**

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB00/02350

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 22-25, 45-58, 61-77.

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 74-77 are so unclear that no meaningful opinion could be formed (*specify*):

... see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the said claims Nos. 22-25, 45-58, 61-73.

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)

Yes: Claims 20, 21, 28, 29, 31-33, 38-42

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02350

	No:	Claims	1-19, 26, 27, 30, 34-37, 43, 44, 59, 60
Inventive step (IS)	Yes:	Claims	
	No:	Claims	20, 21, 28, 29, 31-33, 38-42
Industrial applicability (IA)	Yes:	Claims	1-21, 26-44, 59, 60
	No:	Claims	

2. Citations and explanations  
**see separate sheet**

## VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

### **III Non-establishment of opinion**

Claims 74 to 77 contain references to the description and/or to the drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here. Since claims 74 to 77 are fully based on these references, it is impossible to define the scope of protection of claims 74 to 77 which renders these claims unclear under Article 6 PCT.

### **V Reasoned statement**

Reference is made to the following documents:

- D1: WO 99 20904 A (GRUPPING ARNOLD W) 29 April 1999 (1999-04-29)
- D2: GB-A-2 310 254 (LEDINGHAM CHALMERS TRUSTEE COM) 20 August 1997 (1997-08-20)
- D4: US-A-1 403 699 (LOEWENTHAL) 17 January 1922 (1922-01-17)
- D6: FINDEISEN, DIETMAR: 'Ölhydraulik', 1994, SPRINGER-VERLAG, BERLIN

#### **Claim 1:**

##### Closest prior art

Document D2, which is considered to represent the most relevant state of the art for the subject-matter of claim 1, discloses (the references in parentheses applying to this document) a pump providing a chamber (140) having a volume, an inlet (100, 105) to the chamber, an outlet (80, 85) from the chamber, and means (110) for varying the volume of the chamber.

##### Conclusion

Since all technical features of claim 1 are known from document D2, its subject-matter cannot be considered to meet the novelty requirements set forth in Art. 33(2) PCT. Also the documents D1, D4 and D6 are considered to be novelty destroying for the subject-matter of claim 1.

**Claim 59:**

Closest prior art

Document D1, which is considered to represent the most relevant state of the art for the subject-matter of claim 59, discloses (the references in parentheses applying to this document) a well completion (page 1, lines 1 to 7) including at least one pump, the at least one pump providing a chamber (8a,b) having a volume, an inlet (10) to the chamber, and an outlet (11) from the chamber, and means (5) for varying the volume of the chamber.

Conclusion

Since all technical features of claim 59 are known from document D1, its subject-matter cannot be considered to meet the novelty requirements set forth in Art. 33(2) PCT. Also the document D4 is considered to be novelty destroying for the subject-matter of claim 59.

**Claim 60:**

Closest prior art

Document D1, which is considered to represent the most relevant state of the art for the subject-matter of claim 60, discloses (the references in parentheses applying to this document) a method (page 6, line 29 to page 7, line 8) of artificial lift within an oil/gas well comprising the steps of: lowering a pump to a desired position within a borehole of a well, the pump providing a chamber (8a,b) having a volume, an inlet (10) to the chamber, an outlet (11) from the chamber and means (5) for varying the volume of the chamber; driving the pump so varying the volume of the chamber thereby pumping well fluids downstream through the pump and a tubing of the well.

Conclusion

Since all technical features of claim 60 are known from document D1, its subject-matter cannot be considered to meet the novelty requirements set forth in Art. 33(2) PCT. Also the document D4 is considered to be novelty destroying for the subject-matter of claim 60.

**Claims 2 to 21 and 26 to 44:**

Novelty and inventive step

The additional features of claims 2 to 5, 7 to 11, 17, 18 and 34 to 37 are known from D2, those of claims 12 to 16, 18, 19, 26, 27, 30, 43 and 44 from D6, and that of claim 6 from D4. Dependent claims 20, 21, 28, 29, 31 to 33 and 38 to 42 propose additional features which are matters of normal design procedure for a skilled person or relate to minor constructional modifications, which fall within the scope of customary praxis of a person skilled in the art. Thus, these claims do not contain any additional features which, in combination with the features of any claim which they refer to, could form a subject-matter which is new and involves an inventive step.

**VII Certain defects**

1. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
2. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1, D2, D4 and D6 is not mentioned in the description, nor are these documents identified therein.
3. The vague and imprecise statements in the description, namely the use of words "may" starting from page 4, line 23 implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them (see also the PCT Guidelines, III-4.3a).
4. The in claim 14, 38 to 41 and 44 used bracketed expressions "(s)" are not reference signs in the sense of Rule 6.2(b) PCT, and it is therefore unclear, whether they are part of the subject-matter or not.
5. The units of measure [""] and pressure [PSI] employed on page 18, lines 13 and 15 are not additionally expressed in terms of the units stipulated by Rule 10.1(a) PCT.

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>DM/HSo/P10742PC</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/GB00/02350</b>	International filing date ( <i>day/month/year</i> ) <b>16/06/2000</b>	Priority date ( <i>day/month/year</i> ) <b>18/06/1999</b>
International Patent Classification (IPC) or national classification and IPC <b>F04C11/00</b>		
Applicant <b>ROTECH HOLDINGS LIMITED et al.</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 7 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I    ☒ Basis of the report
- II   ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV   ☐ Lack of unity of invention
- V    ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI   ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  <b>17/01/2001</b>	Date of completion of this report  <b>28.09.2001</b>
Name and mailing address of the international preliminary examining authority:   <b>European Patent Office</b> <b>D-80298 Munich</b> Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  <b>Savela, R</b>  Telephone No. +49 89 2399 2685





# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02350

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, pages:

1-20 as originally filed

### Claims, No.:

1-77 as originally filed

### Drawings, sheets:

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

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☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 22-25, 45-58, 61-77.

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 74-77 are so unclear that no meaningful opinion could be formed (*specify*):  
**see separate sheet**

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the said claims Nos. 22-25, 45-58, 61-73.

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Yes: Claims 20, 21, 28, 29, 31-33, 38-42

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	No:	Claims	1-19, 26, 27, 30, 34-37, 43, 44, 59, 60
Inventive step (IS)	Yes:	Claims	
	No:	Claims	20, 21, 28, 29, 31-33, 38-42
Industrial applicability (IA)	Yes:	Claims	1-21, 26-44, 59, 60
	No:	Claims	

2. Citations and explanations  
**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

### **III Non-establishment of opinion**

Claims 74 to 77 contain references to the description and/or to the drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here. Since claims 74 to 77 are fully based on these references, it is impossible to define the scope of protection of claims 74 to 77 which renders these claims unclear under Article 6 PCT.

### **V Reasoned statement**

Reference is made to the following documents:

- D1: WO 99 20904 A (GRUPPING ARNOLD W) 29 April 1999 (1999-04-29)
- D2: GB-A-2 310 254 (LEDINGHAM CHALMERS TRUSTEE COM) 20 August 1997 (1997-08-20)
- D4: US-A-1 403 699 (LOEWENTHAL) 17 January 1922 (1922-01-17)
- D6: FINDEISEN, DIETMAR: 'Ölhydraulik', 1994, SPRINGER-VERLAG, BERLIN

#### **Claim 1:**

##### Closest prior art

Document D2, which is considered to represent the most relevant state of the art for the subject-matter of claim 1, discloses (the references in parentheses applying to this document) a pump providing a chamber (140) having a volume, an inlet (100, 105) to the chamber, an outlet (80, 85) from the chamber, and means (110) for varying the volume of the chamber.

##### Conclusion

Since all technical features of claim 1 are known from document D2, its subject-matter cannot be considered to meet the novelty requirements set forth in Art. 33(2) PCT. Also the documents D1, D4 and D6 are considered to be novelty destroying for the subject-matter of claim 1.

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**Claim 59:**

Closest prior art

Document D1, which is considered to represent the most relevant state of the art for the subject-matter of claim 59, discloses (the references in parentheses applying to this document) a well completion (page 1, lines 1 to 7) including at least one pump, the at least one pump providing a chamber (8a,b) having a volume, an inlet (10) to the chamber, and an outlet (11) from the chamber, and means (5) for varying the volume of the chamber.

Conclusion

Since all technical features of claim 59 are known from document D1, its subject-matter cannot be considered to meet the novelty requirements set forth in Art. 33(2) PCT. Also the document D4 is considered to be novelty destroying for the subject-matter of claim 59.

**Claim 60:**

Closest prior art

Document D1, which is considered to represent the most relevant state of the art for the subject-matter of claim 60, discloses (the references in parentheses applying to this document) a method (page 6, line 29 to page 7, line 8) of artificial lift within an oil/gas well comprising the steps of: lowering a pump to a desired position within a borehole of a well, the pump providing a chamber (8a,b) having a volume, an inlet (10) to the chamber, an outlet (11) from the chamber and means (5) for varying the volume of the chamber; driving the pump so varying the volume of the chamber thereby pumping well fluids downstream through the pump and a tubing of the well.

Conclusion

Since all technical features of claim 60 are known from document D1, its subject-matter cannot be considered to meet the novelty requirements set forth in Art. 33(2) PCT. Also the document D4 is considered to be novelty destroying for the subject-matter of claim 60.

**Claims 2 to 21 and 26 to 44:**

Novelty and inventive step

The additional features of claims 2 to 5, 7 to 11, 17, 18 and 34 to 37 are known from D2, those of claims 12 to 16, 18, 19, 26, 27, 30, 43 and 44 from D6, and that of claim 6 from D4. Dependent claims 20, 21, 28, 29, 31 to 33 and 38 to 42 propose additional features which are matters of normal design procedure for a skilled person or relate to minor constructional modifications, which fall within the scope of customary praxis of a person skilled in the art. Thus, these claims do not contain any additional features which, in combination with the features of any claim which they refer to, could form a subject-matter which is new and involves an inventive step.

**VII Certain defects**

1. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
2. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1, D2, D4 and D6 is not mentioned in the description, nor are these documents identified therein.
3. The vague and imprecise statements in the description, namely the use of words "may" starting from page 4, line 23 implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them (see also the PCT Guidelines, III-4.3a).
4. The in claim 14, 38 to 41 and 44 used bracketed expressions "(s)" are not reference signs in the sense of Rule 6.2(b) PCT, and it is therefore unclear, whether they are part of the subject-matter or not.
5. The units of measure [""] and pressure [PSI] employed on page 18, lines 13 and 15 are not additionally expressed in terms of the units stipulated by Rule 10.1(a) PCT.

# INTERNATIONAL COOPERATION TREATY

## PCT

### INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>DM/HSo/P1074PC</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 00/ 02350</b>	International filing date (day/month/year) <b>16/06/2000</b>	(Earliest) Priority Date (day/month/year) <b>18/06/1999</b>
Applicant  <b>ROTECH HOLDINGS LIMITED</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

#### 1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. :

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1  
☐ Non of the figures.

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:  
**1-21, 26-44, 74-77**
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.
3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.
4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 20904 A (GRUPPING ARNOLD W) 29 April 1999 (1999-04-29)	1-21, 26-36, 43, 44, 59, 60, 74-77
Y	claim 1; figures 1-3 ---	37-41
Y	GB 2 310 254 A (LEDINGHAM CHALMERS TRUSTEE COM) 20 August 1997 (1997-08-20) claims 1-4 ---	37-41
X	PATENT ABSTRACTS OF JAPAN vol. 008, no. 124 (M-301), 9 June 1984 (1984-06-09) & JP 59 029788 A (HITACHI SEISAKUSHO KK), 17 February 1984 (1984-02-17) abstract ---	1, 3-21, 26-35
X	US 1 403 699 A (LOEWENTHAL) 17 January 1922 (1922-01-17)  page 2, line 3 - line 79; figures 1, 4 ---	1-14, 17, 20, 21, 26, 27
A	US 2 462 732 A (DUSEVOIR) 22 February 1949 (1949-02-22) -----	

☐

Further documents are listed in the continuation of box C.

☒

Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family



**Patent Family Annex**  
 Information on patent family members

International Application No  
**PCT/GB 00/02350**

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9920904	A	29-04-1999	NL 1007327 C	23-04-1999
			NL 1007405 C	23-04-1999
			NL 1007613 C	23-04-1999
			AU 9765798 A	10-05-1999
			EP 1025362 A	09-08-2000
			NO 20001918 A	21-06-2000
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GB 2310254	A	20-08-1997	NONE	
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JP 59029788	A	17-02-1984	NONE	
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US 1403699	A	17-01-1922	NONE	
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US 2462732	A	22-02-1949	NONE	
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